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COMPLETE SPECIFICATION.

Means for Preserving or Protecting the Lead Supports of the Positive Electrodes of Secondary or Storage Batteries from Peroxidation.

I, PASCAL MARINO, of 51, Gloucester Crescent, Regent's Park, in the County of London, Chemist, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, that is to say: -

This invention relates to a method or means for preserving or protecting, from peroxidation, the pure lead, or antimonial lead, supports of the active material which form the positive electrodes of a lead accumulator, or secondary or storage battery; and it has for its object to render these supports non-peroxidisable by the action of the electrolyte, and thus to enable them to be made of a minimum thickness. By the treatment about to be described, the said positive supports are not acted upon, and are rendered unperoxidisable, figuring, therefore, simply as conductors of the electric current, and serving only as a bearing for the electro-chemical actions which operate in the active material which is spread on and covers the two surfaces of the said metallic supports.

By protecting the lead supports of the positive electrodes from peroxidation, a long life is ensured for same; the principal cause of the short life of a lead storage battery, being, without doubt, due to the peroxidation changing the molecular structure of the supports of the positive electrode.

For the purpose of my invention, I treat the said supports or grids of the electrodes with a mixture prepared as follows: Pure gutta-percha, or other similar substance, as for instance india-rubber, celluloid, or the like, but preferably gutta-percha, is first thoroughly dissolved, by means of a suitable solvent, in a closed vessel, until it is reduced to a clear and sticky mass, and presents the appearance, and assumes the consistency of a varnish, and then a sufficient quantity of impalpable powder of antimony is mixed with the same, and the two thoroughly stirred until they assume the consistency of oil paint. Or a sufficient quantity of finely pulverized graphite is added to the above solution, and the two thoroughly stirred until they also assume the consistency of oil paint. Or finely pulverized graphite and finely powdered antimony are added to the above solution or similar binding vehicle, and the whole well stirred together, until the mixture assumes the consistency of oil paint.

The proportions of antimony to graphite can be varied without detriment, but I find that 2 parts of antimony to 1 part of graphite give good results.

The pure lead, or antimonial lead, supports forming the positive electrodes of the battery, or accumulator, are then treated by applying to them a thin layer or coating of any of the above mentioned mixtures. This may be effected, either by dipping them into the mixture, or by applying the mixture to them, by means of a brush, or by any other suitable means, which will give them a thin coating all over. The conductivity of the surfaces of the supports or grids is in no way diminished by this protective coating, as the latter is in itself quite as conductive as metallic lead, and effectually prevents peroxidation of the supports or grids by the action of the electrolyte, so that, in this manner, it is the positive active material only which undergoes the electro-chemical action of peroxidation, and not the lead supports themselves. Further, the grids or supports treated with this mixture, as described, can be heat without

the coating showing any tendency to crack, or detach itself from the support, and this covering or coating will not only resist the corrosive electro-chemical action of the electrolyte, but it possesses, above all things, in accordance with the well known laws of electrolysis, the electro-positive tension in harmony with the active positive material. If this were not the case, the battery or accumulator, would discharge itself spontaneously by the local action which would take place by the difference between the active material and the metallic coated supports. In short, the electric current under these conditions acts more readily on the active material, which it is able to electrolyse more easily, owing to its porosity, than the metallic supports which are denser and more compact in structure. These supports, therefore, merely act as conductors of the current, and can consequently be of very thin lead, a few tenths of a millimetre in thickness being amply sufficient for this purpose. This advantage admits of a considerable economy being effected in the weight of the supports when treated by my process as compared with the lead and antimonial lead supports employed in the present electric accumulators or storage batteries, and solves the weight problem, which has been one of the greatest drawbacks to the lead accumulators up to the present.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Means for preserving or protecting from peroxidation the pure lead, or antimonial lead, supports of the positive electrodes of secondary or storage batteries, with a preservative which is, at the same time, a conductor of the electric current, the said means consisting in covering or coating them with a composition consisting of a solution of gutta-percha, or other like substance (such as india-rubber or celluloid), to which impalpable powder of antimony is added and then well stirred therein, substantially as described.

2. In means for the purpose above mentioned, a composition consisting of a solution of gutta-percha, or other like substance (such as india-rubber or celluloid), to which finely pulverized graphite is added, and then well stirred therein, substantially as described.

3. In means for the purpose above mentioned, a composition consisting of a solution of gutta-percha, or other like substance (such as india-rubber or celluloid), to which finely pulverized graphite, and finely powdered antimony, both well mixed together, are added, and then well stirred into the said solution, substantially as described.

4. Positive electrodes of secondary or storage batteries having their lead supports covered or coated with any of the preservative compositions above claimed, and for the purpose set forth.

Dated this 12th day of August, 1909.

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